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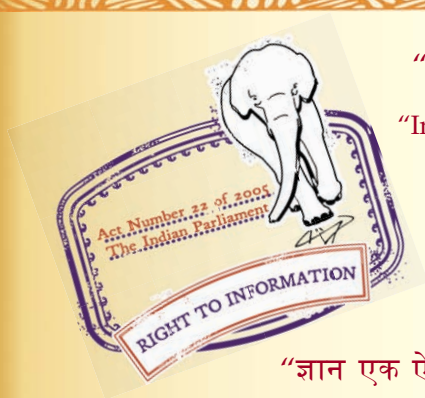
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IS 8983 (1978): Ready mixed paint, finishing, stoving for war equipment [CHD 20: Paints, Varnishes and Related Products]



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“Knowledge is such a treasure which cannot be stolen”

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IS : 8983 - 1978

Indian Standard
SPECIFICATION FOR
READY MIXED PAINT, FINISHING,
STOVING, FOR WAR EQUIPMENT

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SPECIFICATION FOR READY MIXED PAINT, FINISHING, STOVING, FOR WAR EQUIPMENT

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Indian Standard

SPECIFICATION FOR READY MIXED PAINT, FINISHING, STOVING, FOR WAR EQUIPMENT

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 18 October 1978, after the draft finalized by the Paints and Allied Products Sectional Committee had been approved by the Chemical Division Council.

0.2 At present a large number of specifications for paints and allied products, prepared by Directorate of Standardization, Ministry of Defence, Government of India, are in force for procurement of materials for use by Defence services. On a request from Ministry of Defence, the feasibility of aligning specifications prepared by them with the corresponding Indian Standards or preparing separate specification where no such standard exists has been examined. It has now been decided to prepare national standards for commodities which are required in bulk quantities by Ministry of Defence and are also used for other purposes.

0.3 This standard achieves full alignment with JSS 8010-14 Paint, R.F.U. finishing, war equipment, stoving, brushing/spraying, olive green, issued by the Department of Standardization, Ministry of Defence, Government of India. The material is recommended to be supplied in brushing consistency but shall be suitable for spraying after thinning with a suitable thinner.

0.4 This standard contains clause **6.1** which calls for agreement between the purchaser and the supplier.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Rules for rounding off numerical values (revised).

1. SCOPE

1.1 This standard prescribes requirements and methods of sampling and test for the material commercially known as ready mixed paint, finishing, stoving, for war equipment. The material is used for protection and maintenance of war equipment and also as exterior petrol resisting paint.

1.1.1 The material shall normally be applied over a suitable priming paint (stoving) but formulation shall be such as to provide reasonable camouflaging and protection if applied direct on metal.

2. TERMINOLOGY

2.1 For the purpose of this standard, the following definition, in addition to those given in 2 of IS : 101-1964* and IS : 1303-1963† shall apply.

2.1.1 Registered Sample — Sample supplied in advance by a prospective supplier and registered by the approved testing authority after testing it to all the requirements of this standard. A complete record of its performance shall be kept in respect of all tests.

3. CLASSES

3.1 The material shall be supplied in brushing consistency but shall be suitable for application by spraying after thinning with petroleum hydrocarbon solvent, low aromatic, 145/205 grade conforming to IS : 1745-1978‡.

4. COLOUR

4.1 The colour of the material shall be scamic (olive green) Indian Standard Colour (ISC) No. 294 (see IS : 5-1978§).

5. REQUIREMENTS

5.1 Pigment Composition — The dry pigment content of the material shall be 33 ± 3 percent by mass. The pigment shall contain minimum 6 percent by mass of green oxide of chromium when determined as prescribed in Appendix A.

5.2 The material shall also comply with the requirements prescribed in Table 1.

*Methods of test for ready mixed paints and enamels (second revision).

†Glossary of terms relating to paints (revised).

‡Specification for petroleum hydrocarbon solvents (second revision).

§Colour for ready mixed paints and enamels (third revision).

TABLE 1 REQUIREMENTS FOR READY MIXED PAINT, FINISHING, STOVING, FOR WAR EQUIPMENT

(Clause 5.2)

SL No.	CHARACTERISTIC	REQUIREMENT	METHOD OF TEST, REF TO CL No, IN	
			Appendix	IS : 101-1964*
(1)	(2)	(3)	(4)	(5)
i)	Consistency and viscosity (by flow cup)	Smooth and uniform and within ± 10 seconds of the registered sample	—	7.4 and 7.4.1
ii)	Application	Suitable for application by brushing without appreciable drag on the brush	—	6
iii)	Drying time	Hard dry and mar resistant film when stoved at 140°C for 23 min	—	7.1 and 7.3.2
iv)	Finish	Smooth and semiglossy	—	7.5
v)	Wet opacity	Between —10 percent and + 20 percent of the registered sample	—	10
vi)	Colour	Close match to specified colour	—	11
vii)	Scratch hardness	Bare metal shall not be visible through the scratch under load of 1.5 kg	—	15.1
viii)	Flexibility and adhesion	No damage or detachment or cracking of the film	—	16
ix)	Protection against corrosion	There shall be not more than very slight change of colour, not more than slight superficial rust spotting, no blistering of permanent nature (blistering which does not subside within 24h after removal of the painted panel from the corrosion cabinet shall be termed as permanent), no brittleness of the paint film and the metal surface underneath the film shall not show any sign of corrosion	—	18†
x)	Resistance to lubricating oil	No sign of permanent injury	—	19

*Methods of test for ready mixed paints and enamels (*second revision*).

†Except for duration of the test period which shall be 10 days.

(Continued)

TABLE 1 REQUIREMENTS FOR READY MIXED PAINT, FINISHING, STOVING, FOR WAR EQUIPMENT — *Contd*

SL No.	CHARACTERISTIC	REQUIREMENT	METHOD OF TEST, REF TO CL No. IN	
			Appendix	IS : 101-1964*
(1)	(2)	(3)	(4)	(5)
xi)	Resistance to petrol benzol mixture	No sign of permanent injury	B	—
xii)	Resistance to heat	No sign of cracking, blistering and appreciable change of colour when stoved at 150°C for 2 h. In this respect the film shall not be inferior to registered sample	—	22
xiii)	Water absorption test	Amount of water absorbed shall not exceed 5 mg/cm ² of painted surface exposed	C	—
xiv)	Resistance to warm water at 45 ± 3°C for 4 h	No fading or change of colour	D	—
xv)	Resistance to salt water	No rust spotting, flaking or peeling or any other deterioration of the paint film when examined at a magnification of 10 diameter	E	—
xvi)	Durability	To pass the test	F	—
xvii)	Flash point, °C, <i>Min</i>	30	—	24
xviii)	Calcium compounds in the dry pigments (as CaO), percent by mass, <i>Max</i>	5	G	—
xix)	Barium compounds in dry pigments (as BaSO ₄), percent by mass, <i>Max</i>	33	H	—
xx)	Water content (if water is suspected to be present), percent by mass, <i>Max</i>	0.5	—	14
xxi)	Lead restriction	Not a lead paint	—	28
xxii)	Mass in kg/10 litres	Within ± 3 percent of the registered sample	—	25
xxiii)	Keeping properties, <i>Min</i>	The material shall not cake hard inside the containers and shall retain properties for one year from the date of delivery	—	31

*Methods of test for ready mixed paints and enamels (*second revision*).

6. PACKING AND MARKING

6.1 Packing — Unless otherwise agreed to between the purchaser and the supplier, the paint shall be packed in metal containers conforming to IS : 1407-1968* or IS : 2552-1970†.

6.2 Marking — Each container shall be marked with the following:

- a) Name and colour of the material;
- b) Name of the manufacturer and/or his recognized trade-mark, if any;
- c) Volume of the material;
- d) Batch No. or lot No. in code or otherwise; and
- e) Month and year of manufacture.

6.2.1 The containers may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

7. SAMPLING

7.1 Representative samples of the material shall be drawn and treated as prescribed under 3 of IS : 101-1964‡.

7.2 Criteria for Conformity — A lot shall be declared conforming to the requirements of this standard if the test results on a composite sample satisfy the requirements prescribed in 5.

8. TEST METHODS

8.1 Tests shall be conducted according to the methods prescribed in IS : 101-1964‡ and Appendices A to H. References to the relevant Appendices and clauses of that standard are given in col 4 and 5 of Table 1 respectively.

*Specification for round paint tins (*first revision*).

†Specification for steel drums (galvanized and ungalvanized) (*first revision*).

‡Methods of test for ready mixed paints and enamels (*second revision*).

8.2 Quality of Reagents — Unless specified otherwise, pure chemicals and distilled water (*see* IS : 1070-1977*) shall be employed in tests.

NOTE — ' Pure chemicals ' shall mean chemicals that do not contain impurities which affect the result of analysis.

8.3 For match against Indian Standard colour, IS : 5-1978† shall be used.

APPENDIX A

(Clause 5.1)

DETERMINATION OF GREEN OXIDE OF CHROMIUM

A-0. GENERAL

A-0.1 Chromium oxide (Cr_2O_3) content of the pigment is estimated from acid insoluble chromium compounds. The method involves the estimation of total chromium compounds as Cr_2O_3 in paint and acid soluble chromium compounds as Cr_2O_3 in pigment of the paint.

A-1. REAGENTS

A-1.1 Sodium Peroxide

A-1.2 Sulphuric Acid — concentrated.

A-1.3 Potassium Permanganate Solution — 5 percent (m/v).

A-1.4 Silver Nitrate Solution — 10 percent (m/v).

A-1.5 Ammonium Persulphate

A-1.6 Hydrochloric Acid — Dilute.

A-1.7 Phosphoric Acid — Relative density 1.7.

A-1.8 Ferrous Ammonium Sulphate Solution — approximately 0.1 N.

A-1.9 Standard Potassium Permanganate Solution — 0.1 N.

A-2. ESTIMATION OF CHROMIUM COMPOUNDS IN PAINT

A-2.1 Procedure — Weigh accurately about 1 to 2 g of the paint in a nickel crucible and ignite over a gas flame. Fuse it with 5 g of sodium peroxide over a gas flame, keeping the molten mass at low red heat for 5 minutes. Dissolve the cooled fusion cake in the crucible in 200 ml of

*Specification for water for general laboratory use (*second revision*).

†Colours for ready mixed paints and enamels (*third revision*).

warm water and transfer the rinsings to a beaker. Add concentrated sulphuric acid to adjust to 10 percent acidity in the solution. Add 4 to 6 drops of 5 percent potassium permanganate solution and 1 to 2 ml of silver nitrate solution. Heat to boil. Add ammonium persulphate till pink colour of potassium permanganate reappears. Add dilute hydrochloric acid just to destroy the pink colour. Boil to expel chlorine. Cool and add 5 ml of phosphoric acid. Add exactly 50 ml of ferrous ammonium sulphate solution with vigorous stirring. A deep green colour develops when reduction is complete. Titrate the excess of ferrous ammonium sulphate solution with standard potassium permanganate solution, taking the first faint darkening of the clear green colour as the end point. Run a blank, starting from peroxide fusion, in the same manner and at the same time. Note the volumes of potassium permanganate solution required in both cases.

A-3. ESTIMATION OF ACID SOLUBLE CHROMIUM COMPOUNDS IN PIGMENT

A-3.1 Procedure — Weigh accurately about 0.5 to 1 g of the dried pigment of the sample and digest it in 200 ml of water in a covered beaker. Add 25 ml of sulphuric acid. Boil for 10 minutes, cool and filter. Then proceed as prescribed in A-2.1.

A-4. CALCULATION

A-4.1 Chromium oxide in both the cases as prescribed in A-2.1 and A-3.1 is calculated as follows:

$$\text{Chromium oxide (Cr}_2\text{O}_3\text{), percent by mass} = \frac{(A - B) \times N \times 2.534}{M}$$

where

A = volume in ml of potassium permanganate solution required for blank titration,

B = volume in ml of potassium permanganate solution required in the assay,

N = normality of potassium permanganate solution, and

M = mass in g of the sample taken for the test.

A-4.2 Calculate percent total Cr_2O_3 content of total chromium in pigment as follows:

$$\left(\begin{array}{l} \text{Calculated chromium oxide content} \\ \text{in paint} \end{array} \right) \times \frac{100}{\left(\begin{array}{l} \text{Percent pigment in} \\ \text{the sample of paint} \end{array} \right)}$$

A-4.3 Calculate acid insoluble chromium oxide as follows:

Acid insoluble chromium (as Cr_2O_3) = $X - Y$
in pigment, percent by mass

where

X = total chromium (as Cr_2O_3) calculated in **A-4.2**, and

Y = acid soluble chromium oxide as determined in **A-3.1**.

A P P E N D I X B

[*Table 1, Item (xi)*]

TEST FOR RESISTANCE TO PETROL-BENZOL MIXTURE

B-1. REAGENTS

B-1.1 Benzol — pure.

B-1.2 Petroleum Ether — boiling range 60 to 80°C, aromatic free.

B-2. PROCEDURE

B-2.1 Take a tin plate panel $150 \times 50 \times 0.315$ mm free from surface imperfections, roughen with No. 0 abrasive paper. Apply the paint by brushing in a single coat to give a dry film mass as specified under **6.4** of IS : 101-1964*. Stove the paint film at 140°C for 23 minutes. Then immerse it in a mixture of 5 parts by volume of benzol and 95 parts by volume of petroleum ether for 5 minutes at room temperature not below 15°C. Examine the paint film for 30 minutes after removal of the panel from the mixture.

B-2.2 The material shall be taken to have passed the requirements of this test if the paint film does not show any sign of permanent injury and withstands the scratch hardness test.

A P P E N D I X C

[*Table 1, Item (xiii)*]

TEST FOR WATER ABSORPTION

C-1. REAGENTS

C-1.1 Paraffin Wax and Beeswax (1 : 1) Mixture — molten.

*Methods of test for ready mixed paints and enamels (*second revision*).

C-2. PROCEDURE

C-2.1 Thoroughly degrease with a suitable solvent and subsequently amalgamate by mercury a clean tin plate panel $150 \times 150 \times 0.315$ mm. Apply the paint by brushing in a single coat to give a dry film mass as specified under **6.4** of IS:101-1964* and stove it at 140°C for 23 minutes. Allow the painted panel to stand at room temperature not below 15°C , for 24 hours.

C-2.2 Seal the edges and corners of the panel by dipping in the molten mixture of paraffin and beeswax and completely immerse in water for 7 days at room temperature, not below 15°C .

C-2.3 Remove the panel from water and immediately cut 100×50 mm film from the panel. Absorb the loosely adherent moisture on both sides of the film by blotting paper. Place the film in a tared weighing tube and weight it. Then heat the weighing tube with its contents at 70°C to constant mass. The loss in mass shall be the amount of water absorbed.

A P P E N D I X D

[*Table 1, Item (xiv)*]

TEST FOR RESISTANCE TO WARM WATER

D-1. PROCEDURE

D-1.1 Take a mild steel plate, $150 \times 100 \times 1.25$ mm free from surface imperfections and roughen with No. 0 abrasive paper. Paint the panel and keep it under drying conditions prescribed in **B-2**. Immerse the panel in water maintained at $45 \pm 2^{\circ}\text{C}$ for 4 hours. Remove the panel, keep at room temperature for 1 hour and examine the dried paint film for any fading or change in colour.

A P P E N D I X E

[*Table 1, Item (xv)*]

TEST FOR RESISTANCE TO SALT WATER

E-1. REAGENTS

E-1.1 Calcium Sulphate — anhydrous.

E-1.2 Magnesium Chloride — anhydrous.

E-1.3 Magnesium Sulphate — anhydrous.

E-1.4 Sodium Chloride

*Methods of test for ready mixed paints and enamels (*second revision*).

E-2. PROCEDURE

E-2.1 Prepare a panel of mild steel of approximately $150 \times 150 \times 1.25$ mm as described in **5.2.1** of IS : 101-1964*, and paint with the material by brushing as prescribed in **B-2**. Stove the panel at 140°C for 23 minutes. Apply another coat of the material and stove as given above. Expose the panel to the following cycle:

- a) One hour immersion in salt water of the following composition:

1) Calcium sulphate, anhydrous	1.3 g
2) Magnesium chloride, anhydrous	2.6 g
3) Magnesium sulphate, anydrous	1.7 g
4) Sodium chloride	21.4 g
5) Water to make	1 000 ml
- b) Three hour exposure outside at an angle of 45° facing south,
- c) One hour refrigeration at $4 \pm 2^{\circ}\text{C}$, and
- d) Exposure outside at 45° facing south till the commencement of the next cycle.

E-2.2 Repeat the cycle 12 times exposing the same side of the panel during each cycle. Examine the exposed side for signs of breakdown of the paint film.

A P P E N D I X F

[Table 1, Item (xvi)]

TEST FOR DURABILITY

F-1. PREPARATION OF PANEL

F-1.1 Prepare the panel as described in **E-2.1**.

F-2. PROCEDURE

F-2.1 Expose the painted panels, in duplicate, outdoors for 6 months at an angle of 45° facing south. At the end of the period examine the test panels under $\times 10$ magnification. The material shall be taken to have passed the durability test if there is no sign of checking, brittleness or other impairment of film integrity, not more than a trace of chalking and no appreciable fading/darkening or change of colour and loss of gloss.

*Methods of test for ready mixed paints and enamels (*second revision*).

In this respect the sample shall not be inferior to the approved sample when tested in the similar manner and at the same time.

NOTE — Provisional acceptance may be given on one month exposure on separate set of painted panels as follows, but the durability of the material be taken only after 6 months exposure as above. The painted panel shall be exposed outdoors for 25 days at an angle of 45° facing south. At the end of this period the panel shall be subjected to a fine spray of water for 6 hours at a temperature not above 30°C. (A suitable spray is provided by a water supply at a pressure of approximately 13.7 KPa through a rose). The treatment shall be carried out daily for six days. The test panels shall be exposed at an angle of 45° facing south between treatment.

APPENDIX G

[Table 1, Item (xviii)]

DETERMINATION OF CALCIUM COMPOUNDS

G-1. REAGENTS

G-1.1 Dilute Hydrochloric Acid — 1 : 1 (v/v).

G-1.2 Ammonium Hydroxide — 20 percent.

G-1.3 Hydrogen Sulphide — gas.

G-1.4 Ammonium Oxalate Solution — saturated.

G-1.5 Standard Potassium Permanganate Solution — 0.1 N
(see 27 of IS : 2316-1968*).

G-1.6 Concentrated Nitric Acid

G-1.7 Ammonium Chloride

G-2. PROCEDURE

G-2.1 Weigh accurately about 0.5 g of the extracted pigment in a 250-ml beaker. Add 50 ml of dilute hydrochloric acid and boil gently for about 5 minutes. Dilute the solution to about 200 ml with water and boil again for 2 minutes. Place the beaker on a water-bath and boil for about 2 to 3 hours. Filter the hot solution through a filter paper (Whatman No. 30 or equivalent) and wash the residue with hot water till the filtrate is free from chloride and lead ions.

G-2.2 Treat the filtrate obtained in **G-2.1** with a few drops of concentrated nitric acid and boil. Add about 5 g of ammonium chloride and make the solution alkaline with ammonium hydroxide. Boil for 15 minutes and filter through a filter paper. Wash the precipitate with

*Methods of preparation of standard solutions for colorimetric and volumetric analysis (first revision).

water and then pass a stream of hydrogen sulphide gas through the filtrate for 15 minutes. Filter off the sulphide and wash 2 to 3 times with saturated solution of hydrogen sulphide. Boil the filtrate to remove hydrogen sulphide and continue boiling after acidifying the solution. Make the solution alkaline to litmus with ammonium hydroxide and heat to boil. Add sufficient quantity of ammonium oxalate solution and boil for 5 minutes. Allow the beaker with the precipitate to stand for 2 hours on a water-bath. Filter the residue through a filter paper (Whatman No. 30 or equivalent) and wash several times with hot water. Ignite it in a porcelain crucible to calcium oxide, cool in a desiccator and weigh to constant mass.

G-2.3 Alternatively, wash the residue on the filter paper with hot water until the filtrate is free from oxalate ions. Wash down the residue on the filter paper into the original beaker with hot water and wash the filter paper with dilute sulphuric acid and collect the washings in the beaker. Heat to about 70 to 80°C and titrate with standard potassium permanganate solution. When the end point is reached, put the filter paper on which the precipitate was washed in the beaker and complete the titration by adding further quantity of permanganate solution. (For filter paper not more than two drops of standard potassium permanganate need be required.)

G-3. CALCULATION

G-3.1 Ignition Method

$$\text{Calcium oxide, percent by mass} = 100 \times \frac{M_1}{M_2}$$

where

M_1 = mass in g of the calcium oxide obtained, and

M_2 = mass in g of the pigment taken for analysis.

G-3.2 Titration Method

$$\text{Calcium oxide, percent by mass} = \frac{2.8 V N}{M_2}$$

where

V = volume in ml of standard potassium permanganate solution,

N = normality of potassium permanganate solution, and

M_2 = mass in g of the pigment taken for the analysis.

APPENDIX H

[Table 1, Item (xix)]

DETERMINATION OF BARIUM SULPHATE

H-1. REAGENTS

H-1.1 Sodium Carbonate — anhydrous.

H-1.2 Sodium Carbonate Solution — 2 g/l.

H-1.3 Dilute Hydrochloric Acid — 1 : 4.

H-1.4 Ammonium Hydroxide — 20 percent (*m/m*).

H-1.5 Concentrated Hydrochloric Acid — See IS : 265-1976*.

H-1.6 Dilute Nitric Acid — 1 : 1 (*v/v*).

H-1.7 Methyl Orange Indicator Solution — Dissolve 0.1 g of methyl orange in 100 ml of water.

H-1.8 Ammonium Sulphate Solution — 3 percent.

H-2. PROCEDURE

H-2.1 Weigh about 1 g of the extracted pigment in a dry and clean 250 ml beaker. Add 20 ml of dilute nitric acid. Cover the beaker and digest it over hot plate for one hour. Dilute the contents to about 150 ml, filter through filter paper, wash the insoluble residue several times. Ignite the residue in platinum crucible. Cool it and add about 8 g of anhydrous sodium carbonate and cover the crucible. Fuse the mixture over a Meker burner for 40 minutes. The fusion is started with a low flame which is gradually raised to full blast. This precaution is necessary to prevent loss due to overflowing.

H-2.2 Cool and as the melt cools, rotate the crucible so that the fused mass solidifies in a thin layer. This will shorten the time required for leaching. Leach out the fusion with 200 ml of hot water in a 400-ml beaker. Filter through a 15 cm filter paper (Whatman No. 40 or equivalent). Wash several times by decantation, then remove the crucible from the beaker, transfer the insoluble carbonates to the filter, and wash with hot sodium carbonate solution, testing after the twelfth washing to be certain that sulphates have been removed completely.

*Specification for hydrochloric acid (*second revision*).

H-2.3 Cover the funnel containing the insoluble carbonates with a watch-glass and add hot dilute hydrochloric acid carefully, in small portions at a time to prevent loss, catching the solution in a 600-ml beaker. Add hot dilute hydrochloric acid to the platinum crucible and the beaker in which the leach was made and pour over the filter. Wash the paper with hot water until free from chlorides.

H-2.4 Neutralize this solution with ammonium hydroxide using methyl orange as indicator. Add 0.4 to 0.6 ml of concentrated hydrochloric acid. Dilute to 400 ml of with hot water, bring the solution to boiling, and add 25 ml hot ammonium sulphate solution dropwise with constant stirring to prevent co-precipitation of calcium and magnesium. Transfer the beaker to a warm hot plate and allow to stand for at least 4 hours. Filter on an ignited weighed Gooch crucible, wash with hot water several times by decantation. The beaker should be scrubbed thoroughly to remove any adhering precipitate. Continue the washing until free of chlorides. Ignite the crucible in a muffle furnace for 35 minutes at 850°C. Cool in a desiccator and weigh. Make a blank determination in a similar manner with an equal amount of sodium carbonate and other reagents.

H-3. CALCULATION

$$\text{Barium sulphate, percent by mass} = 100 \frac{(A - B)}{M}$$

where

A = mass in g of the precipitate with the material,

B = mass in g of the precipitate in the blank determination,
and

M = mass in g of the material taken for the test.